



File Code: 3413

Date: January 29, 2015

Subject: Mountain pine beetles around Rail Gulch and campgrounds south and west of Unity

To: District Ranger, Whitman Unit, Wallowa-Whitman National Forest

I was on the District, accompanied by Mike Johnson, entomologist, and Joe Sciarrino, on September 22, 2014 to look at the mountain pine beetle situation in the Rail Gulch area. Mountain pine beetle populations are high throughout the Blue Mountains but the largest populations are in the Rail Gulch area south to Crane Prairie on the Prairie City district. We spent some time in the campgrounds along the South Fork of the Burnt River, evaluating the current mortality and immediate future risk to the campground. We drove up the south fork of the Burnt River on the 2640 road, all the way into the Malheur NF, then got on the 1210 to the 1220 and finally out on the 1200 (Fig. 1).

Observations in September indicate that the population has continued to expand in 2014 and likely will continue to cause high mortality until the majority of susceptible trees are dead or conditions change to increase their resistance to attack.

Around 2008 populations of mountain pine beetles started to increase markedly in this area between Prairie City and Unity after over a decade of high, but not outbreak levels. Initially much of the mortality was in lodgepole pine but in recent years both ponderosa and lodgepole have been heavily attacked. Populations will continue to increase in this area while susceptible host trees remain. Stands are generally overstocked, highly susceptible, and drought conditions seem likely to continue.

When mountain pine beetles begin to increase in an area of lodgepole pine, they attack the larger trees with thicker phloem (Boone et al. 2011). These trees provide high quality beetle habitat and beetles can build up high populations in them. Then beetles emerge to attack neighboring trees. As mountain pine beetle outbreaks progress, the area encompassed enlarges but the intensity of attack within an area also increases. At first just a few trees in an area are attacked, and then more and more trees within the area are attacked. In lodgepole dominated stands, mortality can range from 50% to 90% of the pine component (Pelz & Smith 2012; Progar 2005; McGregor et al. 1987), as the beetles maintain high populations and slowly find and kill most of the susceptible lodgepole pine. After the current outbreak, some lodgepole not susceptible or not found by the beetles is likely to remain until the next outbreak. Outbreaks with high populations of beetles can last for 8-10 years.

Mountain pine beetles have about one generation a year, flying and attacking new trees beginning in late June through early August. All pine species in the Blue Mountains are susceptible to attack. A few pioneering female beetles attack a tree and produce pheromones that attract more beetles and an individual tree is mass attacked within a day or two (Safranyik & Carroll 2006). Mass attacked trees have sawdust encircling their trunks and caught in bark crevices, and sometimes are covered with pitch tubes. These trees are dead but their needles



remain green for months, much like a cut Christmas tree. The aerial surveys conducted in late summer reveal trees that are red at that time (Figure 1). These are trees that were attacked and killed the previous summer, in this case in 2013 (Figure 2). During our ground reconnaissance we found numerous lodgepole pine and ponderosa pine that had been mass attacked in 2014 but had not yet faded from green crowns. Many trees will turn red over this winter/spring.

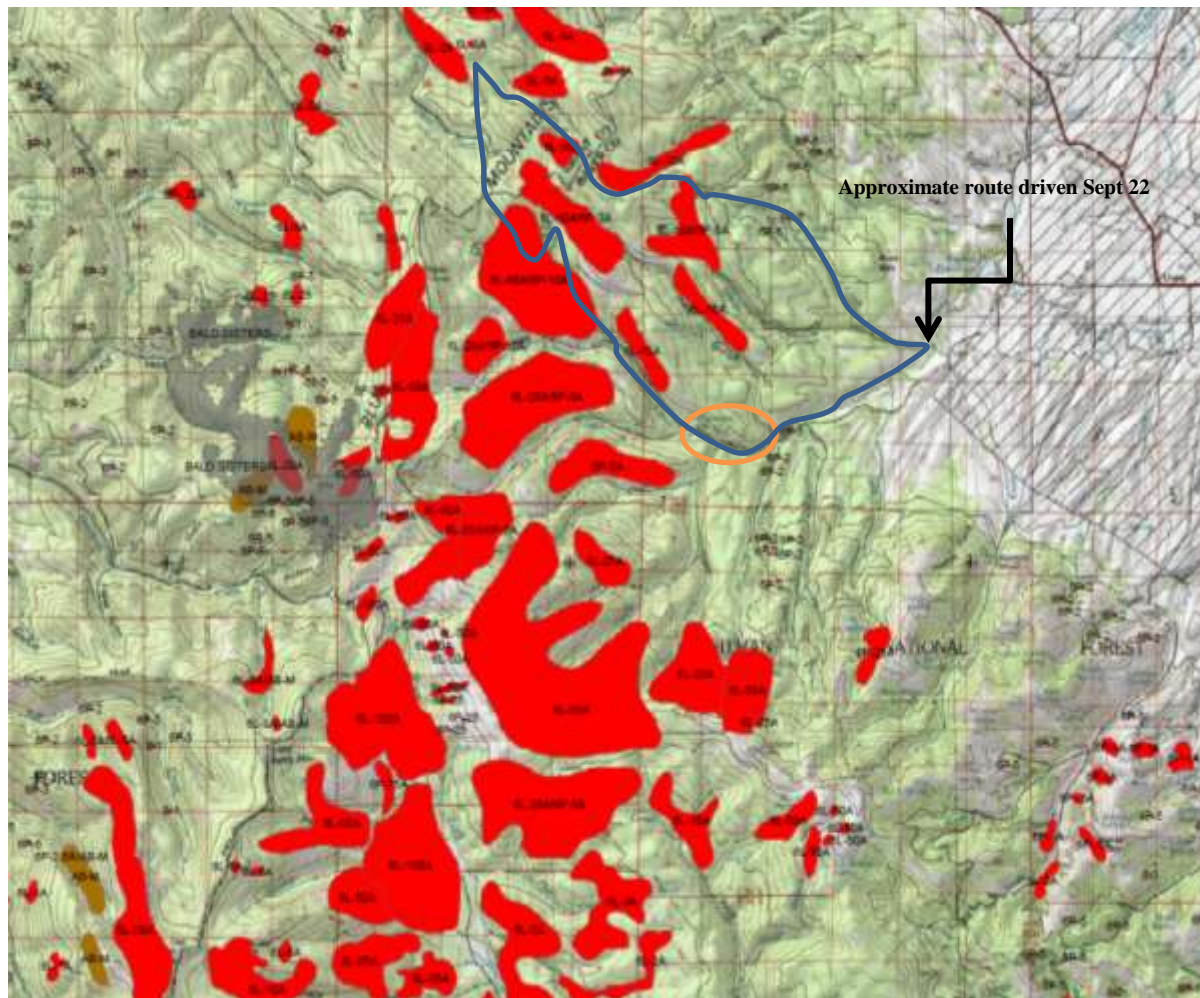


Figure 1: Driving route (blue polygon) and Aerial detection survey 2014; red polygons indicate red trees seen from the air. Agent and severity is coded such that 6=mountain pine beetles, L=lodgepole pine, P=ponderosa pine, and 10A means 10 trees/acre, 20A means 20 trees/acre. Orange oval indicates area of campgrounds. These overview surveys provide only a snapshot in time as an indicator of conditions on the ground and are not intended to replace more specific information. (Map by USDA Forest Service, Forest Health Protection; Washington Department of Natural Resources, and Oregon Department of Forestry, <http://www.fs.usda.gov/detail/r6/forest-grasslandhealth/insects-diseases/?cid=stelprdb5294941>).

We drove up the south fork of the Burnt River to look at the campgrounds located downslope from the mountain pine beetle outbreak area. The campgrounds along the Burnt River tend to be mixed conifer, with ponderosa pine, western larch, spruce, lodgepole pine, grand fir, and Douglas-fir. Many of the lodgepole pine in these campgrounds had been infested with

mountain pine beetles. Some attacks were a year or two old, and some attacks had occurred in 2014. Probably most, if not all, of the lodgepole pine over 6 inches in diameter in these campgrounds will succumb to mountain pine beetles in the next few years. Some of the ponderosa pine had been attacked this year but the attack rate in this species was not as heavy. These stands are overstocked and very susceptible to beetle attack.



Figure 2: Looking southwest toward Deardorff Mountain;

The more southern campgrounds are in drier vegetation types more dominated by ponderosa pine with fewer associated species (Fig. 3). A desirable character of all of these campgrounds is the large, old ponderosa pines. Ponderosa pines are one of the longest lived species in the Blue Mountains, capable of living to 650 but typically living to 300 years (Powell 2000). However many of the older trees are now being killed by mountain pine beetles well before reaching 300. Where ponderosa pines are growing in close competition with other trees or intermixed with lodgepole pine, they are highly susceptible to beetle attack particularly now with high populations all around.

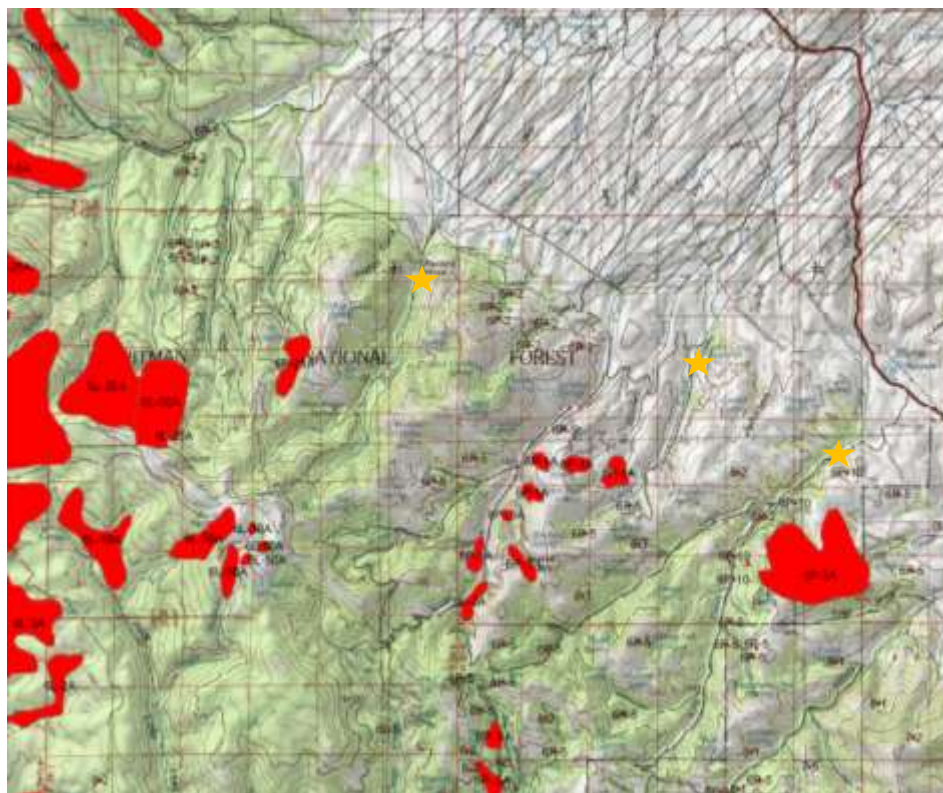


Figure 3: Aerial detection survey 2014, south of Unity. Orange stars indicate recreation sites, from west to east: Bullrun trailhead, Long Creek Campground, El Dorado Campground.

Density management in all these campgrounds should be implemented to benefit the desirable trees. For mountain pine beetles it has been shown that thinning will immediately lower the risk of attack by altering the microclimate around the retained trees (Sartwell & Dolph 1976). Thinning increases the wind, temperature, and sunshine in these stands (Amman & Logan 1998). This allows the tree- and beetle-produced

chemicals that normally attract more beetles and increase the chance of mass attack to dissipate and reduce the risk of mass attack. Over the long-run, trees will have increased vigor due to reduced competition and thus have reduced susceptibility to beetle attack (Sartwell & Stevens 1975). Additionally, in mixed species stands where the pine component is reduced the beetles will be less successful at finding hosts and more beetles will succumb to predation.

We continued to look at pines and mountain pine beetles throughout our loop drive and found mountain pine beetles nearly everywhere. The lodgepole pines were most heavily hit. Where the beetles had been active for a few years, the only surviving lodgepole pines were under 6" in diameter with some areas approaching complete mortality. Attacks in lodgepole pine appeared to be decreasing in many areas simply due to lack of living hosts. There were more red dead trees (attacked in 2013) than green dead trees (attacked in 2014). Attacks in ponderosa pines appeared to lag behind lodgepole by a year or two: there were many green attacked trees, and some areas still had green unattacked susceptible trees.

In lodgepole pine stands mountain pine beetles are inevitable unless fire occurs first. These two agents, fire and beetles, are directly responsible for the generally short life span of lodgepole pines of around 100 years. Thus management of lodgepole pine must take mountain pine beetles into account. Where lodgepole occurs in mixed stands there are options to manage for age and species diversity. Where lodgepole pine is desired, salvage of dead lodgepole and removal of shade tolerant species will allow lodgepole pine to remain dominant. But in the absence of salvage or stand-replacing fire, many of these stands will slowly succeed to more shade tolerant species (Whitehead et al. 2004). Where lodgepole exists in a monoculture or is heavily

dominant, as in many of these stands, mountain pine beetle outbreaks recur about every 20-40 years, depending on stand conditions (Amman 1977). As dead trees fall and break apart, regeneration can occur in openings, resulting in lodgepole pine forests of mixed ages. Without management, when lodgepole pine reaches about 80 years of age it becomes very susceptible to mountain pine beetles.

Lodgepole pine stands with a high percentage of trees over 6", older than 80 years, and with basal area stocking over 120 ft²/acre or 300-600 stems/acre over 3" are at highest risk to mountain pine beetle attack (Steele et al. 1996; Shore et al. 2000). Ponderosa pines are similarly susceptible to mountain pine beetles, although outbreaks historically have lasted longer and been more widespread in lodgepole pine than in ponderosa pine in the Blue Mountains. Ponderosa pine over about 6-8" in diameter and growing in densities over about 120 ft²/acre are at greatest risk. Where ponderosa pine is growing in mixed stands with lodgepole pine, they are at high risk. We found this to be true. Many of the ponderosa pine growing intermixed with lodgepole was attacked either in 2013 (red in September) or 2014 (green in September).

Lodgepole pine can be managed *to prevent beetle outbreaks from developing*. A key factor in successful beetle attack is stand density. When stands are thinned, heat, light, and air currents within these stands change (Amman et al. 1988; Bartos & Amman 1989). When stands are thinned to 4-5 meter spacing, frequency of attack is reduced, successful attack is rare, and conditions are not conducive to outbreak development (Whitehead & Russo 2005). However, once an outbreak has developed and there are high numbers of beetles in an area, any tree can be successfully attacked.

Controlling mountain pine beetle outbreaks is usually not feasible. Control operations require removing nearly every single green infested tree prior to beetle emergence in early summer. Green infested trees are difficult to detect and when outbreaks occur on a landscape scale, most control operations have not been successful at reducing populations due to the large area that must be surveyed and logged.

These high populations will likely continue until most of the susceptible (over 3" DBH and 300-600 stems/acre) lodgepole pines have been killed. Swift action to reduce stocking in the ponderosa pine stands will likely reduce mortality, particularly in mixed species stands where pine hosts are less abundant.

Please contact me with any questions regarding this report.

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